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Y-12

OAK RIDGE
Y-12
PLANT

MARTIN MARIETTA

INVENTORY OF DISPOSALS CONDUCTED IN ROGERS QUARRY

May 1965 through March 1984

Production Optimization Department

April 11, 1984

OPERATED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

INTRODUCTION

This report is being issued to provide an inventory of the Rogers Quarry (also known as Old Rogers Quarry or Bethel Valley Quarry) located on the north side of Bethel Valley Road between the Oak Ridge Associated Universities' (ORAU) Scarboro Facility (formerly the Comparative Animal Research Laboratory) and the Oak Ridge National Laboratory (ORNL). While this report was not requested in the May 26, 1983, Memorandum of Understanding (MOU) between the Department of Energy, Environmental Protection Agency, and the Tennessee Department of Health and Environment, nor in the September 15, 1983, Complaint and Order by James E. Word, Commissioner, Tennessee Department of Health and Environment, the information contained herein should provide the Y-12 Plant, and others, a basis to determine whether or not there is potential environmental impact from Rogers Quarry.

Disposals described in this report are current through March 1984.

HIGHLIGHTS

--Use of Rogers Quarry for Steam Plant ash disposals started in 1962, for classified item disposals in 1965. Both type disposals are continuing today.

--Disposals are predominantly ash, steel, aluminum, and magnesium.

--Through March 1984, approximately 450,000 tons of ash and 800 tons of other materials have been placed in Rogers Quarry.

--Only 1.5% of the number of disposals, excluding ash, involved hazardous materials currently identified by EPA.

--The outfall from Rogers Quarry has an NPDES permit.

HISTORY AND BACKGROUND

The Rogers Quarry site was leased to the Ralph Rogers Company, Inc., by the Manhattan Engineering District or by the Atomic Energy Commission (AEC) to provide rock and gravel for construction needs on the Oak Ridge site. This lease was executed in the 1940s or early 1950s. The Ralph Rogers Company, Inc., is still in business in Oak Ridge.

Sometime in the late 1950s, quarry operations breached an underground water source. For a time, quarry operations continued by using two or more pumps. Upon the failure of one or more of the pumps, the quarry filled with water and the site was abandoned.

Figure 1 (page 4) shows the location of Rogers Quarry relative to the Y-12 Plant site and other landmarks. The "T-bone" shaped area toward the center is the old ravine site for ash disposal from the Y-12 Plant 9401-3 Steam Plant.

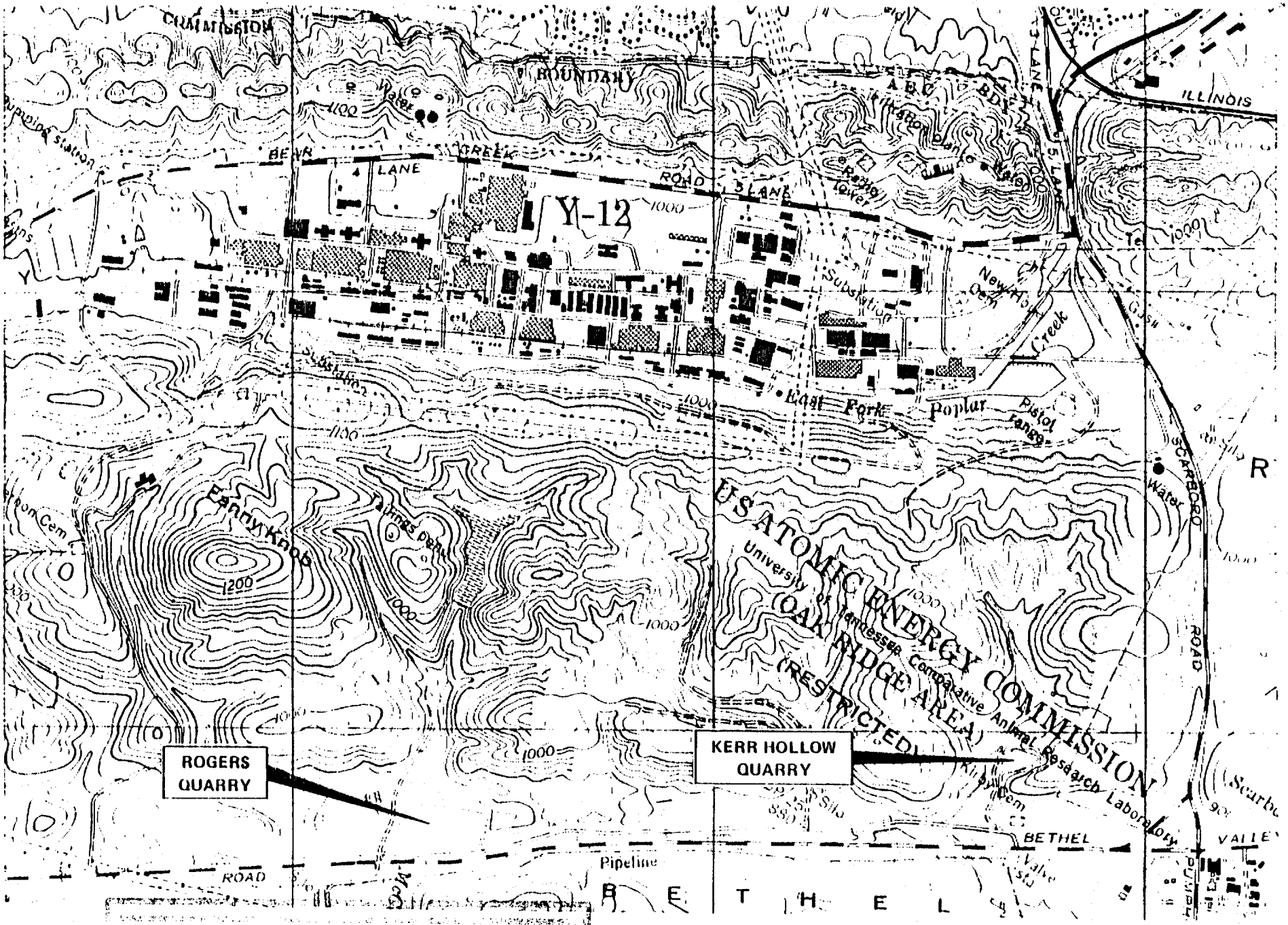


Figure 1

The quarry, as it appeared in 1955, is shown in Figure 2 (page 6). The size and depth of the quarry are apparent by comparing the automobile toward the top of the photograph to the quarry site. The automobile is traveling west toward ORNL on old Bethel Valley Road. New Bethel Valley Road is parallel, tens of feet south, and appears in later figures. The quarry is approximately 1150 feet long x 250 feet wide with a maximum depth of approximately 275 feet. The north face of the quarry is visible from new Bethel Valley Road today.

Figures 3, 4, and 5 (pages 7, 8, and 9) show the Rogers Quarry site as it appeared in the autumn of 1980. Figure 3 shows the ravine ash disposal site in the foreground. In Figure 5, the two smoke stacks at the 9401-3 Steam Plant are visible in the upper right background.

The overflow (outlet) from the quarry flows through two 36-inch diameter concrete pipes beneath Bethel Valley Road to McCoy Branch. The branch flows approximately one-quarter mile and empties into Melton Hill Lake.

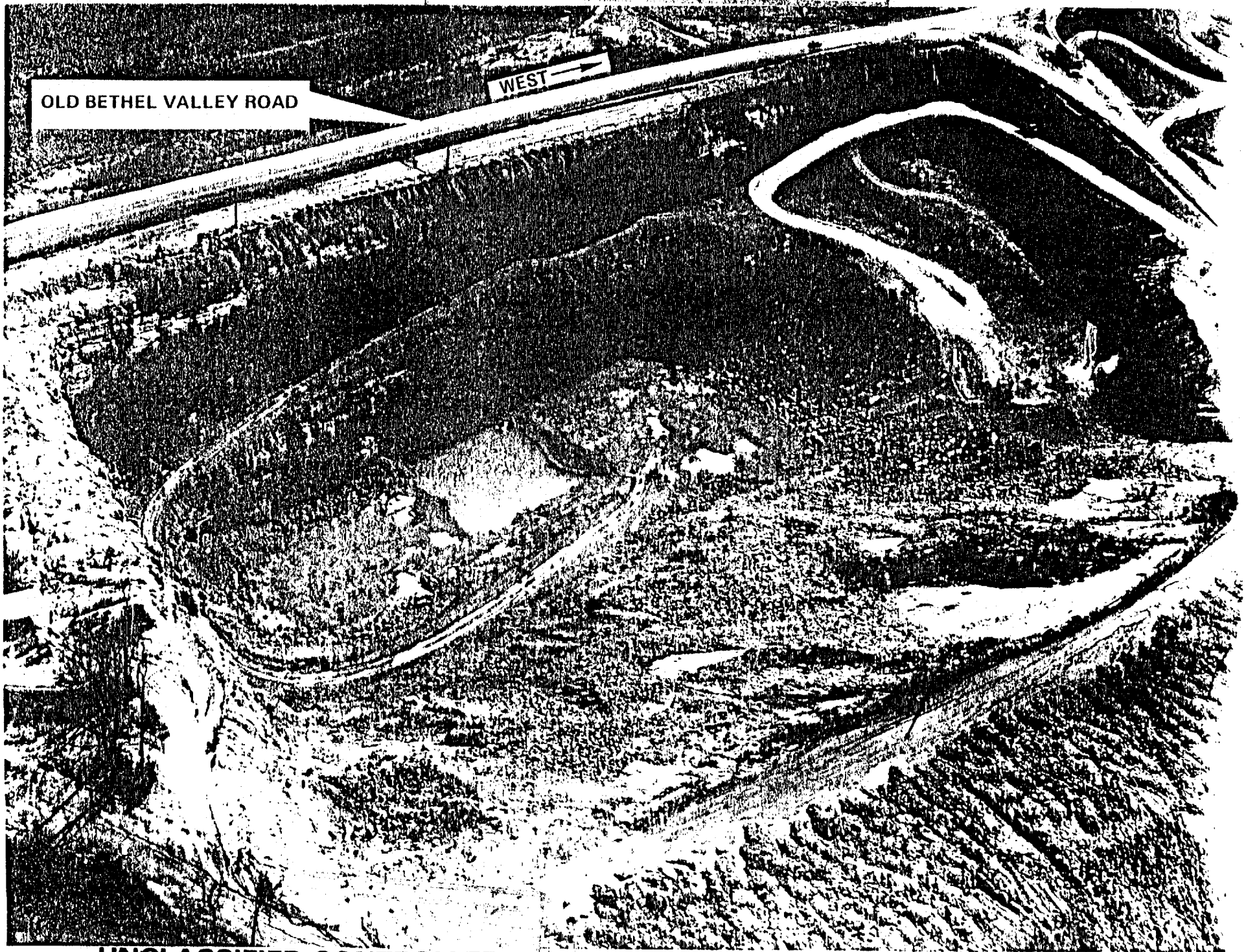
In approximately 1962, the Y-12 Plant started using Rogers Quarry for disposal of ash from the 9401-3 Steam Plant. The ravine ash disposal site described earlier had been in use before then and had filled with ash. The ashes from the Steam Plant are combined with water in a sluice and pumped from the Steam Plant over a hill south of the Y-12 Plant to a channel that flows through Department of Energy property for approximately one mile to Rogers Quarry. The quarry is downhill from the ravine site. The outlet from the quarry and the ash skimmer are visible in Figure 4 (page 8) in the southwest corner (lower right).

The Y-12 Plant requested permission from the then-AEC to make disposals of classified items in Rogers Quarry in a Confidential Restricted Data (CRD) letter from R. F. Hibbs to C. A. Keller, "Disposal of Classified Weapons Components and Tools," May 14, 1964. This permission was granted in a CRD letter from C. A. Keller to R. F. Hibbs, same subject, June 1, 1964. The only stipulations were the need for fencing the area and performing periodic security inspections. These periodic security inspections have continued since the first classified disposals. In 1971, then-AEC requested that grills be added to prevent egress of buoyant items into Melton Hill Lake.

The first weapons-related disposals were made in Rogers Quarry on June 18, 1965. The first nonweapons, but classified, disposals were made on May 4, 1965. The May 4, 1965, disposals consisted of components associated with the General Electric Aircraft Nuclear Propulsion (ANP) Program. Available records did not indicate any disposals, except ash, earlier than these dates.

Disposals of ash and classified items have continued since 1962 and 1965, respectively. Although no classified disposals have been made since 1981, Rogers Quarry is still considered to be available for such disposals.

ORNL has not made disposals in Rogers Quarry (reference: memo from T. W. Oakes, ORNL Environmental Management, to T. C. Myhre, "Rogers Quarry," March 20, 1984).


OLD BETHEL VALLEY ROAD
WEST

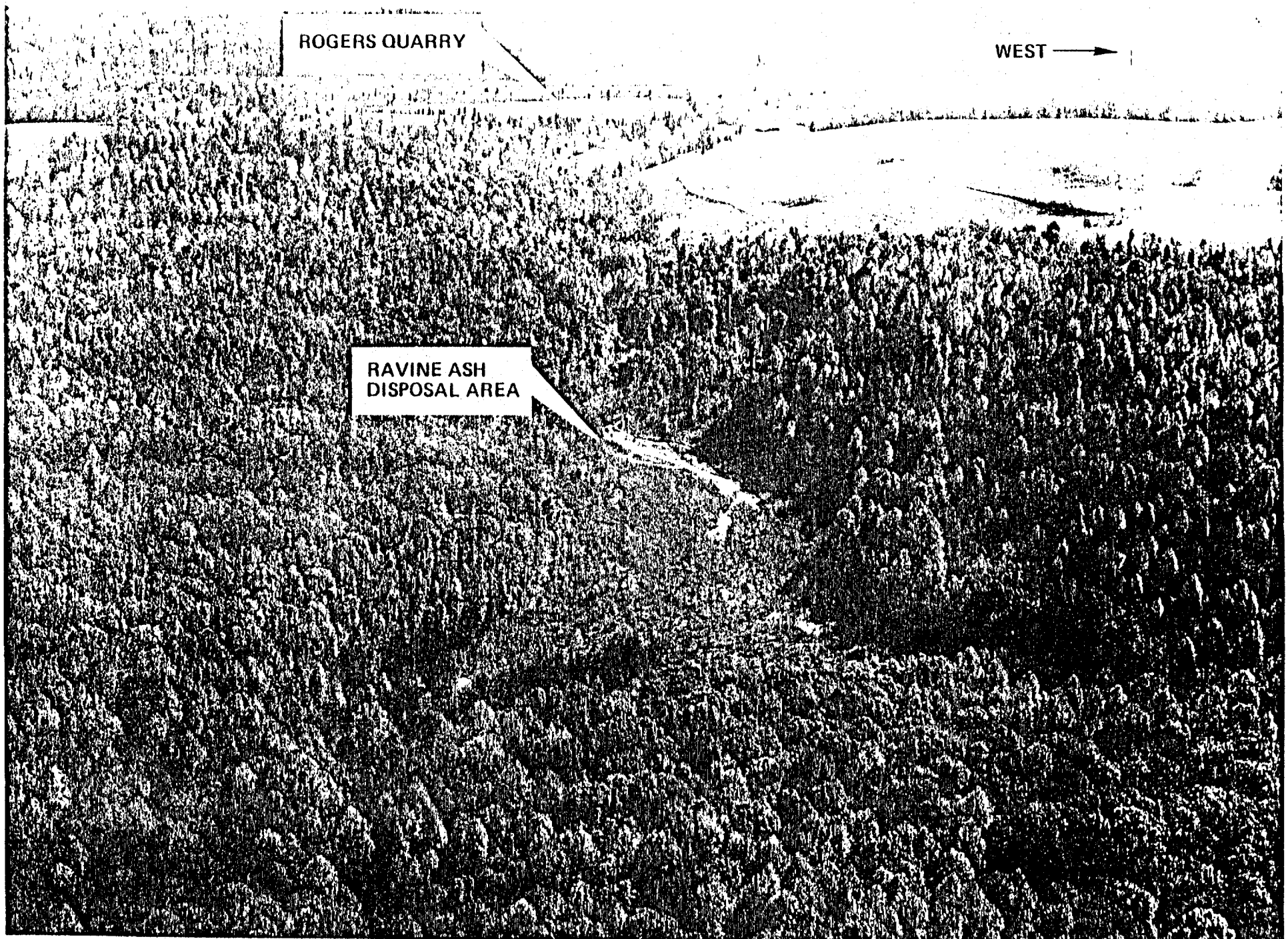
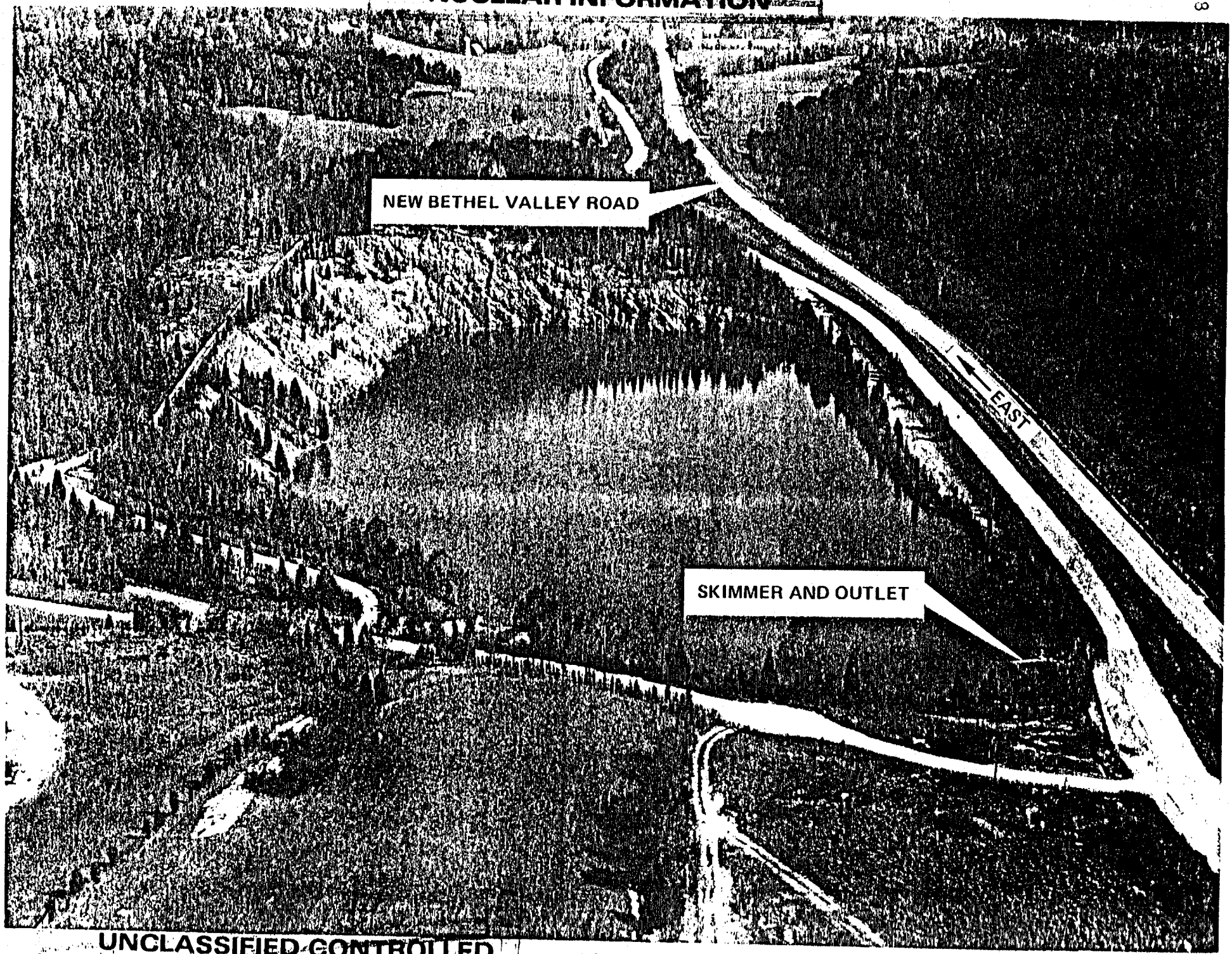


Figure 3


NEW BETHEL VALLEY ROAD
EAST
SKIMMER AND OUTLET

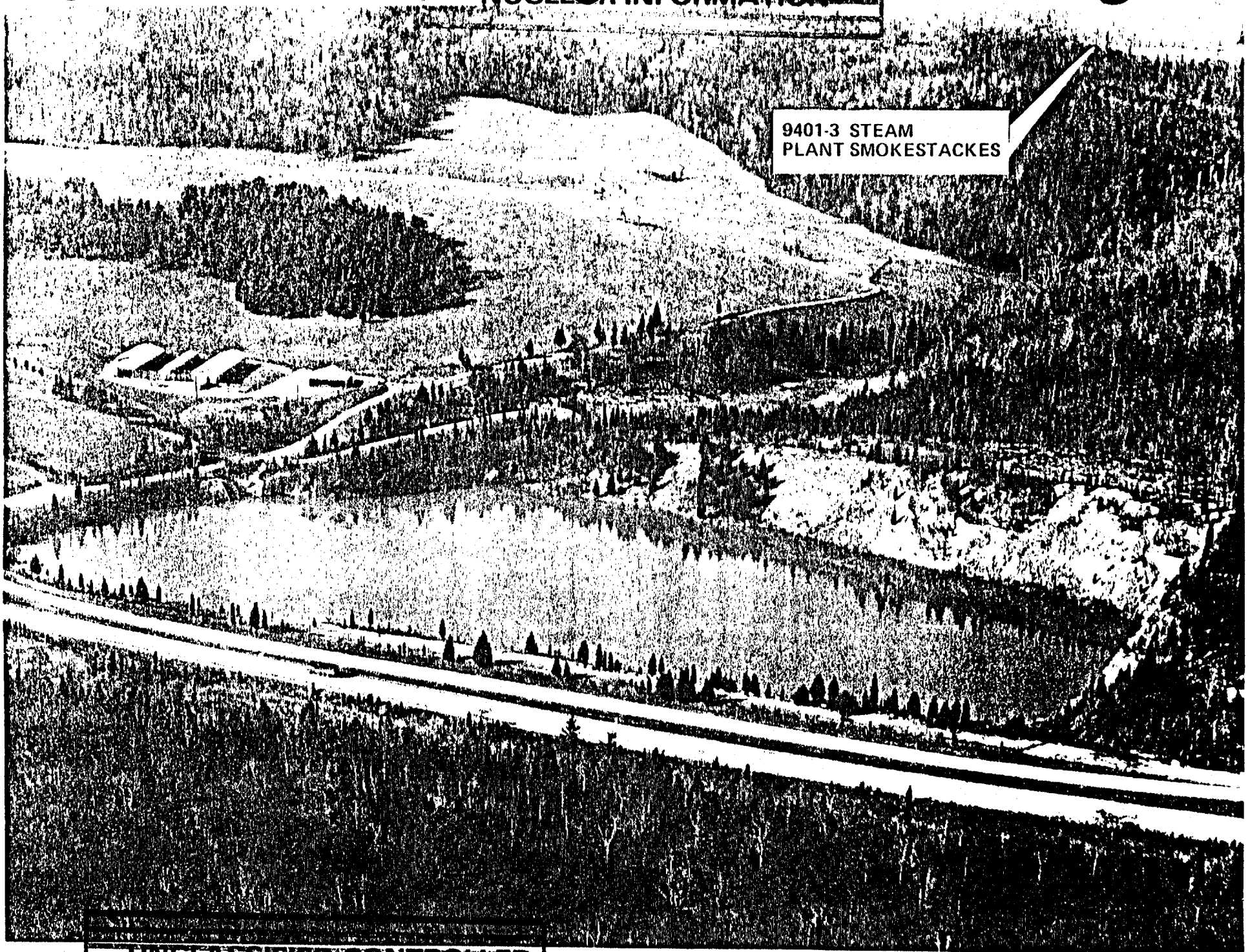


Figure 5

The Environmental Protection Agency, through the State of Tennessee, has granted National Pollutant Discharge Elimination System (NPDES) permit TN0002968-002 for the outfall from Rogers Quarry. Water analyses are performed monthly and reported quarterly to the Department of Energy Environmental Protection Branch on EPA Form 3320-1 (10-72).

Much of this background information was provided by Merwyn Sanders of the Y-12 Plant Environmental Affairs Department.

RECORDS

Records from the Y-12 Plant Maintenance Division provided the quantitative source data and the material descriptions reported herein. These records are:

1. "Trip Log of Unserviceable Material and Equipment" (UCN-2418)

2. "Request for Disposal of Hazardous Chemicals, Gases and Radioactive Materials" (UCN-2109)

3. "Request for Disposal of Classified Equipment and Materials" (UCN-6538)

4. Maintenance Division Monthly Activity Reports

5. Maintenance Division Monthly Disposal Summaries

6. Maintenance Division Classified Disposal Summaries

Records 1, 4, 5, and 6 were initiated and completed within the Maintenance Division. Records 2 and 3 were initiated and partially completed by the requesting areas within the Y-12 Plant and completed by the Maintenance Division.

All available UCN-2109s and UCN-6538s, irrespective of indicated disposal site, were transcribed into a computer data base. The UCN-2418s were statistically sampled. The sampling technique was reported in a letter from G. G. Fee to H. D. Hickman, "Statistical Methods Used During the Inventorying of Y-12 Plant Burial Grounds," September 2, 1983. Altogether, records of over 100,000 disposals were examined and computerized, of which, approximately 1100 were applicable to Rogers Quarry. The remaining records were used in preparation of other reports.

TYPE OF MATERIALS

At least the following materials were disposed of in Rogers Quarry:

1. Ash
2. Aluminum
3. Titanium
4. Steel
5. Brass
6. Lithium Compounds
7. Peroxided Potassium
8. Aluminum-Magnesium Alloy
9. Tungsten Alloy
10. Classified Materials
11. Boric Acid
12. Magnesium
13. Copper
14. Plastic
15. Lead
16. Nylon
17. Thorium
18. Carbon
19. Nickel
20. Cadmium

These materials have been categorized into six major categories, which are consistent with those categories reported in SRD document Y/DS-174, "Bear Creek Burial Ground Documented Disposal Inventory," January 31, 1984. The six major categories are:

1. Acids
2. Debris
3. Heavy Metals
4. Inorganics
5. Organics
6. Thorium

These categories, with associated subcategories, are shown in Table 1, as follows:

Table 1

MATERIAL GROUPS

Major Groups	Subgroups
Acids	Inorganic Acid
Debris	Debris
Heavy Metals	Cadmium Lead
Inorganics	Alkaline Metal Carbon Copper Ferrous Other Inorganic Refractory Metal
Organics	Synthetic High Polymer
Thorium	Thorium

QUANTITY OF MATERIALS

The overwhelming preponderance of material deposited in Rogers Quarry is ash from the 9401-3 Steam Plant. The quantity of ash is estimated at approximately 450,000 tons, with a yearly average of 25,000 tons continuing (reference: memo D. J. Eiler to D. T. Sissom, "Building 9401-3 Steam Plant Ash to Rogers Quarry," February 15, 1984). The total of other materials since 1965 is approximately 800 tons.

Quantitative data for disposals, other than ash, used in this report were taken from two record sources--the Statistical Sample and the Maintenance

Division Monthly Disposal Summaries. These sources share the same origin--the "Trip Log[s] of Unserviceable Material and Equipment" (UCN-2418). Use of the UCN-2418 was discontinued in March 1980 and replaced by the Maintenance Division Classified Disposal Summaries, which provided data to the Monthly Disposal Summaries. The "Request[s] for Disposal of Hazardous Chemicals, Gases and Radioactive Materials" (UCN-2109) and the "Request[s] for Disposal of Classified Equipment and Materials" (UCN-6538) tended to provide better material descriptions than the UCN-2418s but generally lacked good quantitative information. However, quantitative data for the UCN-2109s and UCN-6538s disposals were shown on the UCN-2418s and, thus, statistically sampled.

Data developed from the Statistical Sample were categorized by material, while data in the Maintenance Division Monthly Disposal Summaries show gross totals to particular disposal sites without regard to material type.

Table 2 (page 13) shows the data from the Statistical Sample. The data from the Statistical Sample represent a total projection of the disposal quantity. Table 3 (page 14) shows the gross totals from the Maintenance Division Monthly Disposal Summaries. The total tonnage agreement between Tables 2 and 3, 827 tons and 762 tons, respectively, appears statistically reasonable. The 450,000 tons of ash are additive in either table.

Of the tonnage to Rogers Quarry, ash represents greater than 99%. Excluding the ash, debris (mostly steel) and ferrous represent approximately 88% and aluminum, titanium, and magnesium represent approximately 12%.

Of the 1145 entries in Table 2 (page 13), 46 (4%) lack quantity information. Because of the good agreement between the two tonnage numbers mentioned earlier and because of our involvement with the disposal records, the tonnage represented for these 46 entries is estimated to be small.

Table 2

TOTAL DISPOSAL QUANTITIES TO ROGERS QUARRY

Quantitative Data Derived From the Statistical Sample
Excluding Ash

	Total Number of Entries	Total Estimated Quantity (tons)
Alkaline Metal	4	
Cadmium	2	
Carbon	20	2
Copper	16	
Debris	448	618
Ferrous	432	110
Inorganic Acid	2	
Lead	9	
Other Inorganic	199	97
Refractory Metal	1	
Synthetic High Polymer	11	
Thorium	1	
Total	1145	827

Table 3

TOTAL DISPOSAL QUANTITIES TO ROGERS QUARRY

Quantitative Data From
the Maintenance Division
Monthly Disposal Summaries
Excluding Ash

Year	Pounds
1965	91,700
1966	45,295
1967	155,995
1968	114,459
1969	138,110[1]
1970	178,419
1971	67,672
1972	171,527
1973	73,454[1]
1974	52,086
1975	191,407
1976	75,294
1977	71,175
1978	72,800
1979	8,040[1]
1980	4,700
1981	11,750
1982	0
1983	0
1984	0[2]
Total	1,523,883 (762 tons)

1. Data for 1 of 12 reporting periods missing.
2. Through March 1984

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